1.1 Preface

Malaria is a very serious infectious disease caused by a peripheral blood parasite of the genus Plasmodium. According to the World Health Organization statistics, in 2000, it was estimated that there were 262 million cases of malaria globally, leading to 839.000 deaths. By the year 2015, it was estimated that the number of malaria cases had decreased to 214 million, and the number of deaths decreased to 438.000. Majority of these deaths are children from Sub-Saharan Africa; because the environmental conditions are suitable for mosquitoes and the poor socio-economic conditions make access to health and prevention resources difficult [1]. There are various techniques to diagnose malaria, of which manual microscopy is considered to be "the gold standard". However due to the number of steps required in manual assessment, this diagnostic method is time consuming (leading to late diagnosis) and prone to human error (leading to erroneous diagnosis), even in experienced hands [2].

As mentioned, this manual approach of diagnosis is time consuming and may lead to inconsistency. Thus, this demand trained and experienced technicians or pathologists. This approach once digitized will reduce the time taken for screening the disease. This will improve the consistency in diagnosis [3].

This work investigates the using and application of computer systems for detecting malarial parasites in microscope color images. It proposes a method for parasite detection based on intensity, and texture features. Parasite detection is the fundamental function of this semi-automated diagnosis.

1.2 Problem Statement

Malaria diagnosing is typically made manually. This procedure presents undesirable drawbacks such as slowness, and it presents non-standardized accuracy since it depends on the operator's capabilities.

1.3 Proposed Solutions

To improve the accuracy of malaria diagnosing and to reduce the time consumed by manual procedure. This is achieved by developing a semi-automated system for malaria diagnosing using digital image processing techniques.

1.4 Aim and Objectives

The main aim of this project is to implement Malaria Diagnosis System using Digital Image Processing.

The objectives are:

1. To develop suitable algorithms for detecting Plasmodium parasites.
2. To create a database of red blood cells from available Giemsa stained blood smear images.
3. To design a graphical user interface.
4. To assess the accuracy of the developed algorithms.

1.5 Methodology

This work provides a complete set of solutions for thin blood film malaria diagnosis by using digital image processing. The developed system is structured as follow; first, the image acquisition stage, here a digital camera is to be mounted in the optical path of the microscope to capture an image of

the blood sample. Second, the preprocessing stage, here the image is manipulated in order to remove unwanted objects, and then the image is segmented. Finally, certain features are extracted from the regions of interest. These features will assist the classification unit to determine whether a human host is infected by malaria or not.

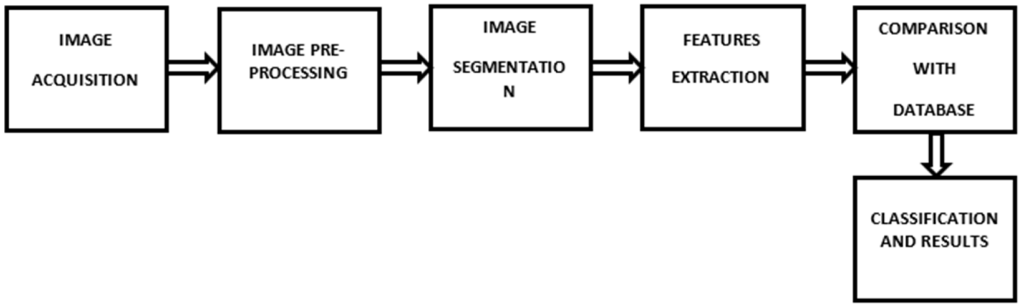

Figure 1-1: System Block Diagram

1.6 Thesis Outlines

This research is consists of five chapters: Chapter 1 introduces the work and states the research problem and proposed solution. It also states research objectives and methodology as well as research outlines. Chapter 2 introduces various malaria diagnosis techniques and briefly summarizes their pros and cons. It also discusses related work that has been carried out by other researchers: It spells out the objectives and significance of the study. It also outlines shortcomings of the preceding work and what the current work address to solve. Chapter 3 provide brief explanations about the methodology used in this study. Chapter 4 presents and analyzes results obtained. Chapter 5 provides the conclusion of the work done and suggest Recommendations for future work.